

Cubit Tutorial Problem Run-through

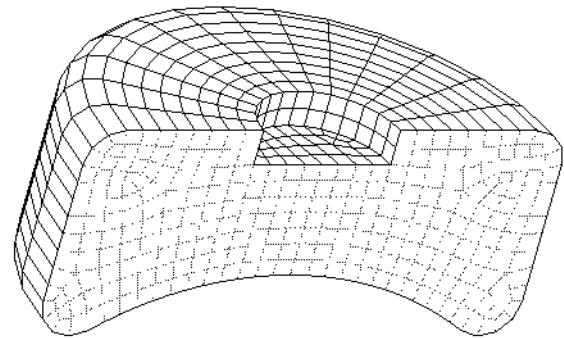
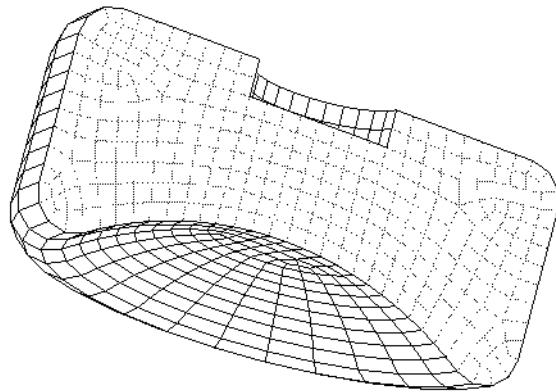


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- Brief Overview of CUBIT Usage

- Illustrates:

- **Geometry Creation**
 - geometry primitives
 - booleans
 - webcut
- **Mesh Generation**
 - surface paving
 - surface mapping
 - 2.5D rotate
 - 2.5D project
- **Model Definition**
 - hex element block
 - shell element block
 - nodeset
- **General**
 - Groups
 - aprepro parameterization
 - Command syntax help
 - “list” options



Design to Analysis Activities



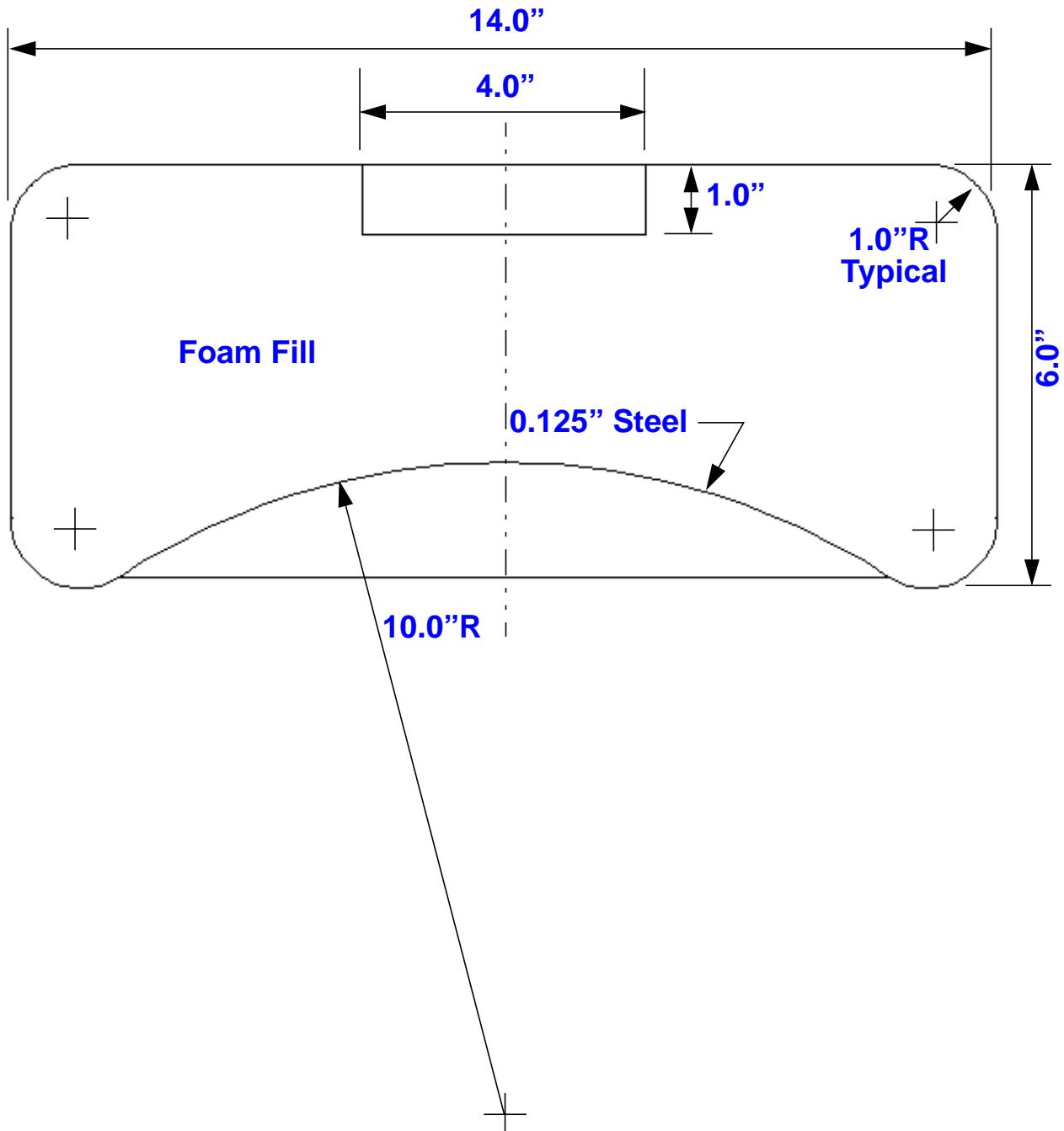
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- **Geometry Creation**
 - Pro/Engineer
 - Fastq
 - Internal
- **Geometry Translation**
 - Cubit geometry format is ACIS (Currently v1.7)
- **Geometry Simplification**
 - Transform design geometry to analysis geometry.
- **Geometry Cleanup**
 - Dirty Geometry, treat degenerate geometry
- **Geometry Decomposition**
 - Create meshable geometry
- **Model Definition**
 - boundary conditions, material groups, and constraints.
- **Manage and identify geometry and mesh interactions**
 - Contact Surfaces or Contiguous Mesh
- **Mesh Generation**
 - Cubit, SEAMS, Patran, ?

Demo Liner Geometry



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Demo-Liner-Create.jou

Geometry Creation Journal File



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```
# Create liner geometry in cubit.  
# 180 degree option
```

```
rotate -90 about x  
brick width 10  
body 1 move y 5
```

```
cylinder height 4 radius 7
```

```
webcut body 2 plane surface 3 noimprint nomerge  
delete body 4
```

```
cylinder radius 6 height 1  
webcut body 5 plane surface 3 noimprint nomerge  
delete body 7
```

```
body 6 copy move z 2.5
```

```
#{l1 = sqrt(121-36)}  
#{l2=l1/11}  
#{DUMP()}
```

```
body 6 move z 0.5
```

```
body 6 move z {-2-l2}
```

```
torus major 6 minor 1  
webcut body 9 plane surface 3 noimprint  
nomerge
```

```
delete body 11
```

```
body 10 copy move z 2  
body 10 move z -2
```

```
delete body 1
```

```
unite body all
```

```
sphere radius 10 ypositive  
body 16 move z {-2-l1}  
subtract 16 from 13
```

```
cylinder height 1 rad 2  
body 18 move z 2.5  
subtract 18 from 17
```

```
cylinder height 8 radius 2  
webcut body 19 tool 20  
delete body 20
```

```
export acis 'gds-liner-create.sat'
```

Demo-Liner-Mesh.jou

Mesh Creation Journal File

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```
## demo-liner-mesh.jou -- Mesh demo-liner.sat      surface 2 to 6 by 4 scheme pave

import acis "demo-liner.sat"                      label surface on
merge all                                         draw volume 2
rotate -90 about x                                volume 2 scheme project source 13 target 12
                                                    surface 12 to 13 scheme pave

group "Symmetry" add surface 6 11 2
group "AllSurf" add surface all
group "Shell" subtract Symmetry from AllSurf
draw Shell                                         volume all size 0.5
                                                    mesh volume 2
                                                    quality volume 2
                                                    delete mesh
                                                    volume 2 layer smooth off
                                                    mesh volume 2
                                                    quality volume 2

label surf on
display
highlight surface 1
Shell remove surface 1
draw Shell                                         display
                                                    mesh volume 1
                                                    display

block 1 Shell
block 1 element type SHELL
block 2 volume 1 to 2
nodeset 10 Symmetry
draw Symmetry
graphics mode wireframe                           list block 1
                                                    block 1 attribute 0.125
                                                    list block 1
                                                    list block 2

draw volume 1
volume 1 scheme rotate source 2 target 6      display
                                                    export genesis "liner-demo.g"
```

Demo-Liner-Create.jou

Parameterized Geometry Creation Journal



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```
# Outer Liner Radius = {LR = 7.0}
# Liner Height      = {LH = 6.0}
# Fillet Radius     = {FR = 1.0}
# Dome Radius       = {DR = 10.0}
# Cup Radius        = {CR = 2.0}
# Cup Depth         = {CD = 1.0}
### Derived Values
# Fillet Center X   = {FCX = LR - FR}
# Fillet Center Z   = {FCZ = LH/2 - FR}

#{I1 = sqrt( (DR+FR)^2 - FCX^2 )}
#{I2 = I1 * FR/(FR+DR)}
#{DUMP()}

cylinder radius {LR} height {LH-2*FR}
cylinder radius {FCX} height {FR}
rotate -90 about x

list body 1 geometry
list body 2 geometry
body 2 copy move z {LH/2-FR/2}
body 2 move z {FR/2} # Bottom of body 2 at 0.0
body 2 move z {-FCZ-I2}

torus major {FCX} minor {FR}
list body 4 geometry

body 4 copy move z {FCZ}
body 4 move z {-FCZ}

unite body all

brick width 10
body 7 move y 5 # Move body 7 so max y = 0.0
### pick surface
webcut body 6 plane surface 19 noimprint
nomerge
delete body 7
draw body 8
delete body 9

sphere radius {DR} ypositive
body 12 move z {-FCZ-I1}
subtract 12 from 8

cylinder radius {CR} height {CD}
body 14 move z {LH/2-CD/2}
subtract 14 from 13

cylinder height {2*LH} radius {CR}
webcut body 15 tool 16
delete body 16
export acis "demo-liner.sat"
```